TURKEY CREEK TMDL FOR FECAL COLIFORM

SUBSEGMENT 080905

US EPA Region 6

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EXECUTIVE SUMMARY

Section 303(d) of the federal Clean Water Act requires states to identify waterbodies that are not meeting water quality standards and to develop total maximum daily pollutant loads (TMDLs) for those waterbodies. A TMDL is the amount of a pollutant that a waterbody can assimilate without exceeding the established water quality standard for that pollutant. Through a TMDL, pollutant loads can be distributed or allocated to point sources and nonpoint sources discharging to the waterbody. A TMDL for the May – October and the November – April seasons have been developed for fecal coliform (FC) for Turkey Creek. FC bacteria are monitored as the indicator for potential human health threats resulting from swimming.

Turkey Creek flows in a generally southerly direction, including the headwaters to Turkey Creek Cut-off and the Turkey Creek Cut-off to Big Creek including Glade Slough. Turkey Creek, subsegment 080905, was listed on both the 1998 and the October 28, 1999 court ordered §303(d) lists as not fully supporting the water quality standard for primary contact recreation (swimming) and was ranked as high priority (ranking 2) for TMDL development. Louisiana's water quality standard for protection of the primary contact recreation (LDEQ, 1999) use reads as follows:

> "Based on a minimum of not less than five samples taken over not more than a 30-day period, the fecal coliform content shall not exceed a log mean of 200/100 mL, nor shall more than 10 percent of the total samples during any 30-day period or 25 percent of the total samples collected annually exceed 400/100 mL. These primary contact recreation criteria shall apply only during the defined recreational period of May 1 through October 31. During the non-recreational period of November 1 through April 30, the criteria for secondary contact recreation shall apply."

The standard for secondary contact recreation reads similarly:

> "Based on a minimum of not less than five samples taken over not more than a 30-day period, the fecal coliform content shall not exceed a log mean of 1,000/100 mL, nor shall more than 10 percent of the total samples during any 30-day period or 25 percent of the total samples collected annually exceed 2,000/100 mL."

Five-years (January, 1996 – December, 2000) of monthly LDEQ monitoring data on Turkey Creek (collected at sampling site #0130) was assessed to determine if the secondary and primary contact recreation uses were being maintained. Data analysis of the results for both seasons show that the secondary and primary contact recreation use is not protected. Therefore, a TMDL has been developed to protect the November – April and the May – October seasons.

For the purpose of calculating current FC loading to Turkey Creek the average FC concentration for the November – April and the May – October seasons were calculated using monthly LDEQ monitoring data from sampling site #0130. The monthly FC counts for the secondary contact recreation season ranged from 50 colony forming units (cfu)/100 mL to 16,000 cfu/100 mL, and the primary contact recreation season ranged from 50 cfu/100 mL to 9,000 cfu/100 mL over the 5-year period (1996-2000).

The criteria of 200 cfu/100 mL for the May – October season and 1,000 cfu/100 mL for the November – April season were used in the development of the TMDL. Figure 1 and 2 represent

FC loading curves for these periods. These loading curves are developed using Equation 1, substituting the criteria, 200 cfu/100 mL and 1000 cfu/100 mL, for the variable C and varying flows. The attempt here is to show that while a TMDL may be expressed as a single point, it can also be thought of as a continuum of points representing the criterion value and various flow values. An 86.6% reduction in FC loading during the May – October season will be needed to protect the primary contact recreation use. A 56.9% reduction in FC loading during the November – April season will be needed to protect the secondary contact recreation use.

1. Introduction

Turkey Creek, subsegment 080905 of the Ouachita River Basin, was listed on both the 1998 and the October 28, 1999 court ordered §303(d) lists as not fully supporting the water quality standard for primary contact recreation (swimming). Subsegment 080905 was ranked as high priority (ranking 2) on the 1998 list. A TMDL for FC bacteria was developed in accordance with the requirements of Section 303(d) of the federal Clean Water Act. The purpose of a TMDL is to determine the pollutant loading that a waterbody can assimilate without exceeding the water quality standard (WQS) for that pollutant; the TMDL also establishes the load reduction that is necessary to meet the WQS in a waterbody. The TMDL consists of the wasteload allocation (WLA), the load allocation (LA), and a margin of safety (MOS). The WLA is the load allocated to point sources of the pollutant of concern, and the LA is the load allocated to nonpoint sources. The MOS is a percentage of the TMDL that accounts for the uncertainty associated with model assumptions and data inadequacies.

2. Study Area Description

2.1 Turkey Creek, Subsegment 080905

Turkey Creek is located within segment 0809 of the Ouachita River Basin in northeastern Louisiana. Turkey Creek flows generally in a southerly direction including the headwaters to Turkey Creek Cut-off and the Turkey Creek Cut-off to Big Creek including Glade Slough. Based on 30 years of reporting records (1961-1990) for the Northeast Weather Division, the average annual precipitation is 55.23 inches (Grymes, 2000).

Land cover in subsegment 080905 is predominately agriculture (62.3%) and forestry (36.2%). Land use coverages were determined using National Land Cover Data (NLCD). The NLCD was produced as a cooperative project between the U.S. Geological Survey (USGS) and the U.S. Environmental Protection Agency (USEPA) to produce a consistent land cover data layer(USGS & EPA, 1995). It is approximately 1995 satellite interpreted data. The data values are 30 meter resolution and in "grid" format. The subsegment areas were provided by the State of Louisiana and are 1999 vintage. The major land uses are listed in Table 1.

Table 1. Land Use (km^2) in Turkey Creek, Subsegment 080905

Coverage Type	Area km^2	Percent of Watershed
Cropland and Pasture	158.88	62.26%
Forested Wetland	72.97	28.60%
Mixed Forest	10.47	4.10%
Deciduous Forest	5.02	1.97%
Evergreen Forrest	3.95	1.55%
Urban	2.58	1.01%
Water	0.98	0.38%
Other	0.33	0.13%
Non Forested Wetland	0	0.00%
TOTAL	255.18	100%

2.2 Water Quality Standards

The designated uses for Turkey Creek include both primary and secondary contact recreation. FC bacteria serve as an indicator used in the assessment of the primary and secondary contact recreation use support. Louisiana's water quality standard for protection of the primary contact recreation use (LDEQ, 1999) reads as follows:

> "Based on a minimum of not less than five samples taken over not more than a 30-day period, the fecal coliform content shall not exceed a log mean of 200/100 mL, nor shall more than 10 percent of the total samples during any 30-day period or 25 percent of the total samples collected annually exceed 400/100 mL. These primary contact recreation criteria shall apply only during the defined recreational period of May 1 through October 31. During the non-recreational period of November 1 through April 30, the criteria for secondary contact recreation shall apply."

The standard for secondary contact recreation reads similarly:

> "Based on a minimum of not less than five samples taken over not more than a 30-day period, the fecal coliform content shall not exceed a log mean of 1,000/100 mL, nor shall more than 10 percent of the total samples during any 30-day period or 25 percent of the total samples collected annually exceed 2,000/100 mL."

2.3 Identification of Sources

The sources identified in the *1998 Louisiana Water Quality Inventory* as affecting the water quality of Turkey Creek are designated as "Other" (LDEQ, 1998). Other sources of FC bacteria are wild and domesticated animals.

2.3.1 Point Sources

There is one known permitted facility discharging sanitary wastewater into Turkey Creek. The flow of this discharger (Town of Winnsboro, NPDES number LA0020281) is 1.20 mgd.

2.3.2 Nonpoint Sources

The predominant land uses along Turkey Creek are cropland (61.02%), pasture (1.23%), and forestry (36.2%); all of which may contribute to FC loads through runoff. It is presently unknown to what extent these sources contribute to FC loads.

3. TMDL Load Calculations

3.1 Current Load Evaluation

FC loads have been calculated using the average seasonal (May – October and November – April) instream bacterial counts and the flow of the stream. The following equation can be used to calculate FC loads.

Equation 1. C x 1000 mL/ L x 1 L/0.264 gallons x Q in gallons/day = cfu/day

Where: C = colony forming units/100 mL
Q = stream flow in gallons/day

A traditional expression of the FC loading may be developed by setting one critical or representative flow and concentration, and calculating the FC load using Equation 1. The difficulty with this approach is in the determination of the appropriate flow or concentration value to use. For the purpose of calculating current loading during the primary contact recreation season (May-October) on this waterbody, the average FC concentration for the May-October season was calculated using monthly LDEQ monitoring data on Turkey Creek (WQ site #0130). In Turkey Creek, the monthly FC counts for this season ranged from 50 cfu/100 mL to 9,000 cfu/100 mL over the five-year period of record (January, 1996-December, 2000). The average FC count for the May – October season is 1,492 cfu/100 mL (Appendix A). The average flow for Turkey Creek, for the May – October season is 69 cfs. Using these values and Equation 1 it is estimated that the current FC loading for the primary contact recreation season (May – October) is 2.5218 E14 cfu/day (Appendix A).

No USGS gage station was located in Turkey Creek (subsegment 080905); therefore, USGS gage station 07370000 (HUC 08050002) in Bayou Macon was used because the land use is similar. The daily average seasonal (May through October) flow was calculated by first obtaining a flow per square mile for the USGS gage station drainage area, and then multiplying by the drainage area for the ungaged LDEQ subsegment. Seasonal flow per square mile was calculated by dividing the daily average seasonal flow (552 cfs) by the USGS gage station drainage area (178 mi^2). The data are not normally distributed, thus the daily average seasonal flow represents the 74.90 percentile. For Turkey Creek (LDEQ segment 081602, drainage area of 98 mi^2) the daily average seasonal flow value is calculated as follows: (552 cfs/782 mi^2) X 98 mi^2= 69 cfs.

For the purpose of calculating current loading during the November – April season on this waterbody, the average FC concentration for the November – April season was calculated using monthly LDEQ monitoring data on Turkey Creek (WQ site #0130). In Turkey Creek, the monthly FC counts for this season ranged from 50 cfu/100 mL to 16,000 cfu/100 mL over the 5-year period of record (January, 1996-December, 2000). The average FC count for the November – April season was 2,320 cfu/100 mL (Appendix A). The average flow for November - April season is 176 cfs. Using these values and Equation 1 it is estimated that the current FC loading for the secondary contact recreation season (November – April) is 1.0002 E15 cfu/day.

The daily average seasonal (November - April) flow was calculated by first obtaining a flow per square mile for the USGS gage station drainage area and, then multiplying by the drainage area for the ungaged LDEQ subsegment. Seasonal flow per square mile was calculated by dividing the daily average seasonal flow (1,401 cfs) by the USGS gage station drainage area (178 mi^2). The data are not normally distributed, thus the daily average seasonal flow represents the 63.2 percentile. For Turkey Creek (LDEQ segment 081602, drainage area of 98 mi^2) the daily average seasonal flow value is calculated as follows: (1,401 cfs/782 mi^2) X 98 mi^2= 176 cfs.

3.2 TMDL

Point sources usually have a defined critical receiving stream low flow such as the 7Q10 at which the criterion must be met. For nonpoint sources it is recognized that there may be no single critical flow condition. To address this condition, FC loading curves for the primary contact recreation season (May 1 – October 31) and the secondary contact recreation season (November – April) have been generated in Figures 1 and 2. These FC loading curves were developed using Equation 1, substituting the criteria (200 cfu/100 mL or 1000 cfu/100 mL) for the variable C and varying flows. The attempt here is to show that while a TMDL may be expressed as a single point, it can also be thought of as a continuum of points representing the criterion value and various flow values. These curves are not stream dependent but are dependent upon the designated stream criterion. Therefore, they may be applied to any stream with a like FC criterion. These curves represent the TMDL for FC loading.

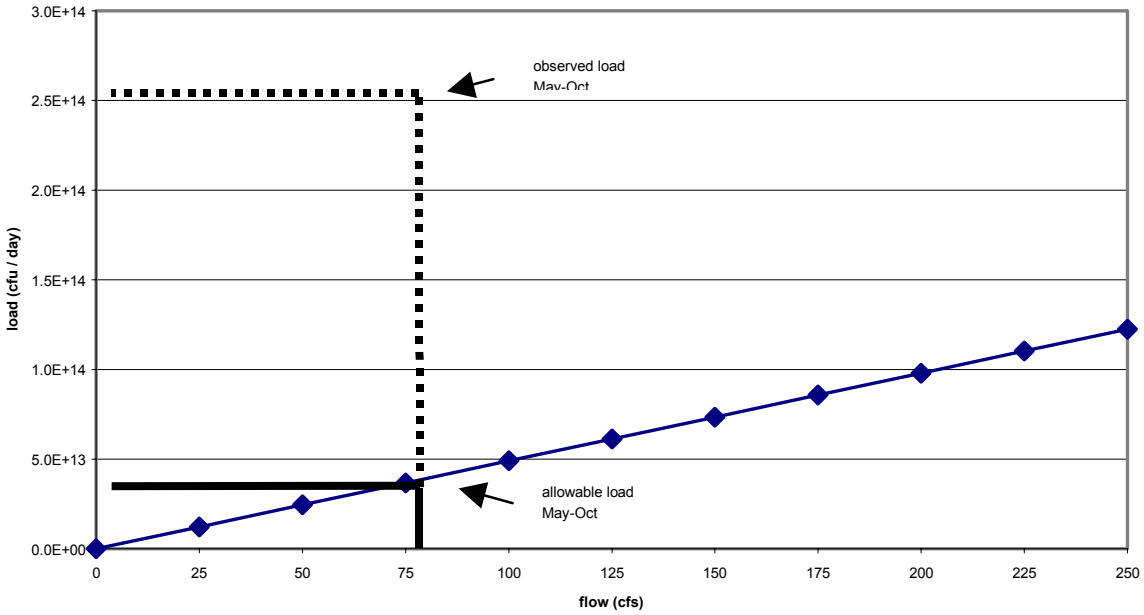

Figure 1. Turkey Creek Fecal Coliform Loading Curve for the May – October season

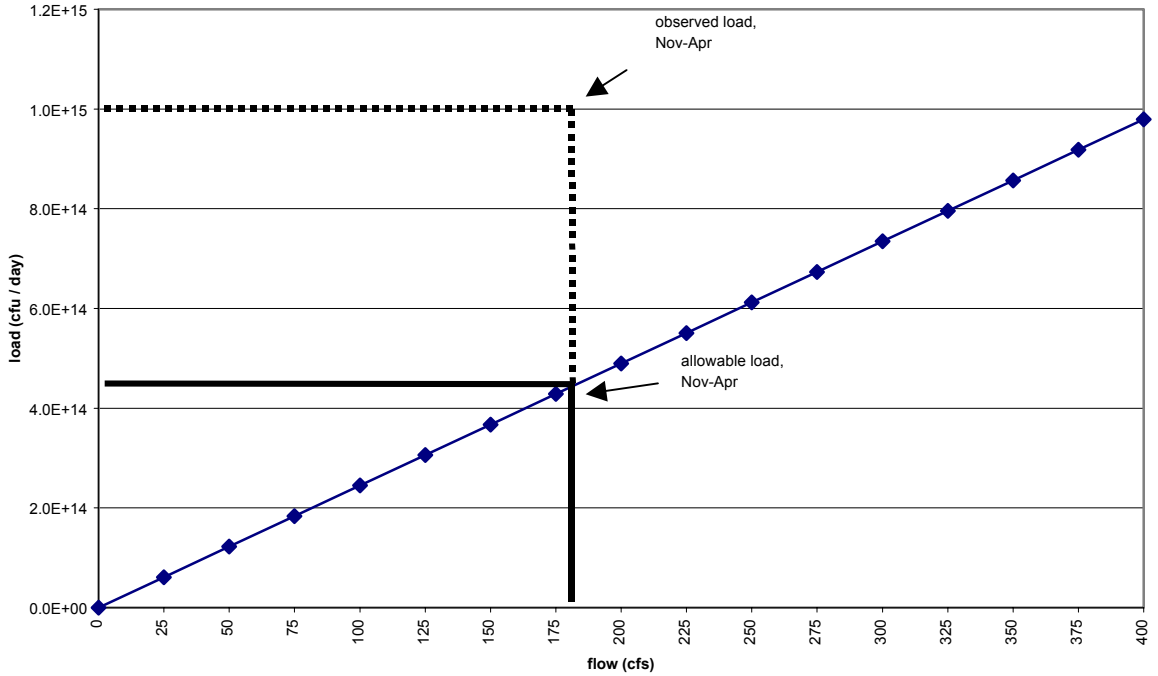

Figure 2. Turkey Creek Fecal Coliform Loading Curve for the November - April season

Utilizing Figures 1 and 2, one can select a stream flow and can quickly determine the TMDL FC loading value. The line formed by these series of points may be thought of as a boundary. At any given flow the loading may be below the line, within the boundary, or above the line. FC load values falling above the line represent disproportionately high values relative to the standard. FC load values falling below the line represent low loads relative to the standard. To develop load reductions one simply needs to determine the appropriate flow value (x-axis) and see where it intersects the load allocation line.

The load reduction needed to meet the WQS for primary contact recreation in Turkey Creek at 69 cfs is 2.1837 E14 cfu/day (86.6 % reduction). This value was obtained by calculating the allowable TMDL at 69 cfs using the 200 cfu/100 ml criterion (3.3804 E13 cfu/day) and subtracting this load from the observed load (2.5218 E14 cfu/day). Complete calculation is shown in Appendix A.

Current Load - TMDL = Load Reduction

2.5218 E14 cfu/day – 3.3804 E13 cfu/day = 2.1837 E14 cfu/day

The load reduction needed to meet the WQS for secondary contact recreation in Turkey Creek at 176 cfs is 5.6908 E14 cfu/day (56.9% reduction). This value was obtained by calculating the allowable TMDL at 176 cfs using the 1000 cfu/100 ml criterion (4.3112 E14 cfu/day); then subtracting this load from the observed load (1.0002 E15 cfu/day). A complete calculation is shown in Appendix A.

Current Load - TMDL = Load Reduction

1.0002 E15 cfu/day – 4.3112 E14 cfu/day = 5.6908 E14 cfu/day

3.3 Wasteload Allocation (WLA)

The Louisiana Water Quality Regulations require permitted point source discharges of treated sanitary wastewater to maintain a FC count of 200 cfu/100 ml in their effluent, i.e., they must meet the standard at end-of-pipe. Therefore, there will be no change in the permit requirements based upon a WLA resulting from this TMDL.

Equation 1 can be used to calculate the total WLA utilizing a FC count of 200 cfu/100 ml and the total volume of the wastewater discharges (1.20 mgd).

200 cfu/100 mL * 1000mL/L * 1 L/0.264 gallons * Q gallons/day = WLA

Where Q = Total volume of sanitary wastewater discharges into Turkey Creek

As reported in Table 2, the total WLA is 9.09 E11 cfu/day. To the best of our knowledge, this is the only potential discharger of FC. This TMDL will be modified if additional dischargers are found to contribute to the FC load.

Table 2. WLA for discharges to Turkey Creek, Subsegment 080905

NPDES NO.	FACILITY	FLOW (mgd)	FC Criterion [MAX]	LOAD
LA0020281	Town of Winnsboro	1.2	200	9.09 E11

3.4 Load Allocation (LA)

The LA for each season for a given flow can be calculated using Equation 1 and the following relationship:

(TMDL@ given flow and criterion) - (WLA)= LA

LA for May – October season at an instream flow of 69 cfs = 2.5217 E14 cfu/day

2.5218 E14 cfu/day (TMDL@ 69 cfs) – 9.09 E11 cfu/day (WLA) = 2.5217 E14 cfu/day

LA for November – April season at an instream flow of 176 cfs = 9.992 E14 cfu/day

1.0002 E15 cfu/day (TMDL@ 176 cfs) – 9.09 E11 cfu/day (WLA) = 9.992 E14 cfu/day

3.5 Seasonal Variability

Louisiana has established a seasonal WQS for bacteria based upon a distinction between a summer swimming season (primary contact recreation) and a winter season (secondary contact recreation). In development of this TMDL, data for both seasons were evaluated; it was determined that a FC TMDL for both seasons was needed to protect the primary and secondary contact recreation use.

3.6 Margin of Safety (MOS)

The Clean Water Act requires that TMDLs take into consideration a MOS. EPA guidance allows for the use of implicit or explicit expressions of the MOS or both. When conservative assumptions are used in the development of the TMDL or conservative factors are used in the calculations, the margin of safety is implicit. When a percentage of the load is factored into the TMDL calculation as a MOS, the MOS is explicit. In this TMDL for FC, conservative assumptions have been used and therefore, the margin of safety is implicit. These conservative assumptions are:

- Using average seasonal flows to calculate current loading to obtain load reduction.
- Treating FC bacteria as a conservative pollutant, that is, a pollutant that does not degrade in the environment (bacteria do die off in the environment).
- Using the more conservative 200 cfu/100 mL standard rather than 400 cfu/100 mL for the summer primary contact recreational season and 1,000 cfu/100 mL rather than 2,000 cfu/100 mL for the winter season.
- Using the design flow of the point source dischargers rather than actual average flow rates, which are typically much lower.

4. Other Relevant Information

Although not required by this TMDL, LDEQ utilizes funds under Section 106 of the federal Clean Water Act and under the authority of the Louisiana Environmental Quality Act to operate an established program for monitoring the quality of the state's surface-waters. LDEQ Surveillance Section collects surface-water samples at various locations, utilizing appropriate sampling methods and procedures for ensuring the quality of the data collected. The objectives of the surface-water monitoring program are to determine the quality of the state's surface waters, to develop a long-term database for water quality trend analysis, and to monitor the effectiveness of pollution controls. The data obtained through the surface-water monitoring program is used to develop the state's biennial 305(b) report (*Water Quality Inventory*) and the 303(d) list of impaired waters. This information is also utilized in establishing priorities for LDEQ nonpoint source program.

LDEQ has implemented a watershed approach to surface water quality monitoring. Through this approach, the entire state is sampled over a five-year cycle with two targeted basins sampled each year. Long-term trend monitoring sites at various locations on the larger rivers and Lake Pontchartrain are sampled throughout the five-year cycle. Sampling is conducted on a monthly

basis or more frequently if necessary to yield at least 12 samples per site each year. Sampling sites are located where they are considered to be representative of the waterbody. Under the current monitoring schedule, targeted basins follow the TMDL priorities. In this manner, the first TMDLs will have been established by the time the first priority basins will be monitored again in the second five-year cycle. This will allow LDEQ to determine whether there has been any improvement in water quality following implementation of the TMDLs. As the monitoring results are evaluated at the end of each year, waterbodies may be added to or removed from the 303(d) list. The sampling schedule for the first five-year cycle is shown below. The Calcasieu and Ouachita River Basins will be sampled again in 2004.

1998 – Mermentau and Vermilion-Teche River Basins
1999 - Calcasieu and Ouachita River Basins
2000 – Barataria and Terrebonne Basins
2001 – Lake Pontchartrain Basin and Pearl River Basin
2002 – Red and Sabine River Basins

(Atchafalaya and Mississippi Rivers will be sampled continuously.)

In addition to ambient water quality sampling in the priority basins, LDEQ has increased compliance monitoring in those basins, following the same schedule. Approximately 1,000 to 1,100 permitted facilities in the priority basins were targeted for inspections. The goal set by LDEQ was to inspect all of those facilities on the list and to sample 1/3 of the minors and 1/3 of the majors.

5. Future Watershed Activities

Point source wasteload allocations will be implemented through LPDES permit procedures.

In Louisiana, nonpoint source load allocations will be addressed through the LDEQ Nonpoint Source Management Program. The *Louisiana's Nonpoint Source Management Plan* (Plan) (LDEQ, 2000), states that TMDLs are being developed through a close relationship between LDEQ and EPA Region 6. It further states that, "management strategies outlined within this document (both statewide and watershed) will be implemented in each of the watersheds where water quality problems have been attributed to nonpoint sources of pollution." On page ii, Objective 3 of the watershed management strategies is to "utilize pollutant load reductions of the TMDL to develop nonpoint source pollution reduction strategies for each of the watersheds ... that have water quality problems identified." Also, Objective 7 provides a tracking process for evaluating progress in reduction in loadings of fecal coliform bacteria.

The Plan includes a discussion of a number of nonpoint source activities and provides Best Management Practices (BMPs) that can be used to achieve the nonpoint source load reductions for fecal coliform as established in the TMDLs. The Plan broadly discusses programs including agriculture, forestry, home sewerage systems, hydromodification, urban runoff, construction and resource extraction. In the court ordered 303(d) list, the suspected cause of fecal coliform is given as agricultural activities. The Plan lists possible sources of fecal contamination from

agricultural activities as originating from activities including, over application of waste, application of waste on unsuitable sites, improper timing of waste application, storm runoff, and concentration of livestock in or near watercourses.

The Plan provides fourteen different BMPs that can be used to reduce fecal coliform loads. Also provided with each of these BMPs is an evaluation of the effectiveness of the BMP given as a high, medium or low ranking. Additional evaluations should be conducted to determine the most likely source of fecal contamination in this watershed and to identify localized hot spots to be targeted for effective BMP implementation. These and other BMPs may be implemented at a scale adequate to achieve the load reductions as established in the TMDL.

6. Public Participation

When EPA establishes a TMDL, 40 C.F.R. § 130.7(d)(2) requires EPA to publicly notice and seek comments concerning the TMDL. The EPA prepared this TMDL pursuant to the consent decree, Sierra Club, et al. v. Clifford et al., No. 96-0527, (E.D. La.) signed and entered on April 1, 2002. Federal regulation requires that public notice be provided through the Federal Register and through newspapers in the local area. The Federal Register notice was issued on March 29, 2002 (Volume 67, Number 61, pages 15196 – 15198). This TMDL was also noticed in local newspapers including The News Star and New Orleans Times-Picayune. Comments and additional information were submitted during the 30-day public comment period. Comments and responses are made available in Appendix B. EPA will provide notice that this TMDL has been made final to the Louisiana Department of Environmental Quality (LDEQ) along with a request that it be incorporated into LDEQ's current water quality management plan.

REFERENCES

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LDEQ, 2000. *State of Louisiana Nonpoint Source Management Plan*. Louisiana Department of Environmental Quality. Baton Rouge, LA.

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APPENDIX A. Fecal Coliform data WQ site #0130 and loading calculations

Turkey Creek WQ site 0130 Subsegment 080905

Secondary Contact Recreation				Primary Contact Recreation		
November – April		FECAL		May - October		FECAL
		COLIFORM				COLIFORM
DATE	TIME	MPN/100ML		DATE	TIME	MPN/100ML
12/21/99	0950	3000		10/26/99	0935	500
11/23/99	0915	300		09/28/99	1000	300
04/27/99	1015	1700		08/24/99	1005	280
03/23/99	1010	50		07/27/99	1005	500
02/23/99	1000	300		06/22/99	0950	2400
01/26/99	0930	300		05/25/99	1000	1600
03/10/98	1200	900		05/12/98	1055	9000
01/13/98	1050	500		09/09/97	1110	240
11/18/97	1100	5000		07/15/97	1230	3000
03/11/97	1100	130		05/13/97	1040	900
01/07/97	1035	300		09/10/96	1100	500
11/19/96	1050	16000		07/09/96	1125	130
03/12/96	1115	2400		05/14/96	1110	50
01/09/96	1120	1600				
	Average =	2320			Average =	1492
% Exceedance of 2000/100ml=	29%			% Exceedance of 400/100ml =	62%	

		Flow	Fecal	Flow	Load	
		Cfs	Count (cfu)	Gal/day	cfu/day	
Current May - Oct Load		69	1492	4.459586 E+07	2.5218 E14	
Allowable May - Oct Load		69	200	4.459586 E+07	3.3804 E13	

		Flow	Fecal	Flow	Load	
		Cfs	Count (cfu)	Gal/day	cfu/day	
Current Nov – Apr Load		176	2320	1.137518 E+08	1.0002 E15	
Allowable Nov – Apr Load		176	1000	1.137518 E+08	4.3112 E14	

APPENDIX B. Comments/Response

EPA received comments from the Louisiana Department of Environmental Quality in a letter dated April 29, 2002 addressed to Ellen Caldwell. The response to comments, specific to Fecal Coliform only, are given below.

FECAL COLIFORM

Contraband Bayou Fecal Coliform (Subsegment 030305)
Turkey Creek Fecal Coliform (Subsegment 080905)
Middle Fork Bayou D'Arbonne Fecal Coliform (Subsegment 080610)
Little River Fecal Coliform (Subsegment 081602)
Clear Lake Fecal Coliform (Subsegment 080910)
Bayou Macon Fecal Coliform (Subsegment 081001)
Bayou Chauvin Fecal Coliform (Subsegment 080102)

General Comments on Fecal Coliform TMDLs:

1. In general, LDEQ does not believe that the TMDL concept was intended to address fecal coliform bacteria. Bacteria are living organisms and are not suited to mathematical computations to estimate loading. In the aquatic environment, bacteria reproduce and die off at rates that vary as in-stream conditions vary.

***Response**: We appreciate the comment. However, EPA is required under CWA 303(d) to develop total maximum daily loads (TMDLs) for those pollutants that do not meet applicable water quality standards. Levels of fecal coliform bacteria in the above listed water bodies were found to be in exceedance of State established criteria. These TMDLs are based on best available data and are the best estimate of bacterial loading based on such data.*

2. These TMDLs do not explain or quantify how much of the nonpoint loading can be attributed to natural sources or natural conditions. Several of these subsegments have forested land uses in excess of 60% indicating the possibility of wildlife contributions. Since the point sources are controlled through permit requirements to meet the standard in their effluent, then it follows that most of the reduction must come from nonpoint loading. How does EPA propose to reduce natural sources of bacteria?

***Response**: These TMDLs are based on all available data and are the best estimate of bacterial loading based on such data. This data did not differentiate between natural sources and anthropogenic sources of bacterial pollutants. Careful consideration of sources, and targeting of these sources for treatment, should take place during the State's implementation phase of these TMDLs.*

3. In calculating the current instream load of fecal coliform bacteria, EPA used the average fecal coliform count based on the available LDEQ water quality ambient data for the appropriate

season and the estimated average seasonal flow for the reach. EPA then calculated a criteria load based on the LDEQ (30 day period) geometric mean criteria value of 200 cfu/100ml and the estimated average seasonal flow. These loads were then used to determine the calculated percent load reduction required. LDEQ believes that this comparison is inaccurate because it does not compare equivalent parameters. It is inappropriate and results in a violation of state regulations to compare an average current instream value to an intended regulatory geometric mean criteria value. If the 200 cfu/100ml criteria is used, Louisiana state regulations require EPA to have a minimum of five samples over a 30-day period in the appropriate season. Since, the required quantity of daily samples are not available, a more reasonable comparison would be using the existing monthly samples to calculate a 75 percentile fecal coliform count and compare it to the state's 75 percentile 400 cfu/100ml criteria. The LDEQ Assessment group currently uses the 75 percentile, 400 cfu/100ml as its assessment criteria and LDEQ believes this would be a more accurate method to determine the percent load reduction. LDEQ takes exception to this practice and requests that these percent reductions be recalculated using an appropriate comparison of instream loads to the 400 cfu/100ml criteria.

***Response**: The geometric mean is required when assessing against the 200cfu/100ml criterion when at least 5 samples were collected during a 30-day. In completing their assessments LDEQ assessed the individual data points against the 400cfu/100ml criterion to determine the percentage of exceedances. This was done because the State of Louisiana does not collect data to verify compliance with the geometric mean portion of their standard. Since only one or two samples were collected per month, it was appropriate to use the arithmetic mean to calculate the current in-stream loads. Because these data are not normally distributed the mean typically represents the 60-75th percentile range. Use of the 75th percentile could be another acceptable way of expressing the current load. We do not believe that significant changes to these TMDLs are warranted.*

EPA believes that the use of the 200 cfu/100ml as a TMDL target is appropriate. LDEQ does not collect data to assess against the 200 cfu/100ml geometric mean. Nonetheless, this criterion does exist and all efforts should be met to meet the established criterion. Establishing the TMDL target at 400 cfu/100ml would not be adequate to be protective of this part of the State's fecal coliform criteria. If the target of 400cfu/100ml is used, it would be very likely that the 200cfu/100ml portion of the criterion would not be met. If however, the target is set to the lower 200cfu/100ml criterion it is more likely that both criterion will be met.

4. Margin of Safety: These TMDLs state that using the 200 cfu/100ml standard rather than 400 cfu/100ml is one of the conservative assumptions included in the implicit MOS. Using the appropriate criteria, LDEQ determined this implicit MOS ranged from 10-65%.

***Response**: We appreciate the comment. It is unclear how these values were calculated but these values do support that the TMDL is conservative. Because of the high levels of uncertainty in this type of TMDL we believe that this is appropriate.*

5. LDEQ generally uses a 20% MOS for dischargers. The listed EPA TMDLs used a design flow with no MOS in its TMDL calculations. LDEQ takes exception to this method and requests that the LDEQ MOS protocol be followed.

***Response**: EPA's calculations use an implicit MOS. We believe that using the facility's design flow for the TMDL calculations is conservative and appropriately represents uncertainties related to point source contributions. The use of an increased flow for the point sources would provide a larger WLA. This could be used to establish an allocation for future growth but should not be used to address MOS.*